

HYDRAULIC AND HYDROLOGIC **FLOOD STUDY**

FOR

CALFEE COMMUNITY & CULTURAL CENTER

**1 MAGNOX DRIVE
PULASKI, VIRGINIA**

February 1, 2023

PREPARED BY:



PLANNERS / ARCHITECTS / ENGINEERS / SURVEYORS

**15871 CITY VIEW DRIVE
SUITE 200
MIDLOTHIAN, VA 23113
P-804-794-0571**

Setting

The flood study was performed on a parcel (Parcel ID: 072-14-1) at 1 Magnox Drive within the Town of Pulaski. The site is currently developed with existing buildings and parking areas that are unused. The site is located on the east side of Tract Fork and just north of the convergence of Tract Fork and Peak Creek. The property is located within the Upper New River Watershed (HUC: 05050001).

According to the FEMA Flood Map Service Center, the site is located within the National Flood Hazard Layer Flood Insurance Rate Map (FIRM) panel number 510126014G dated September 26, 2008 and is depicted containing a floodway, 100-year, and 500-year floodplain limits from Tract Fork located to the northeast of the Magnox Drive bridge over Tract Fork.

Existing Conditions

The site is a developed property approximately 2.66 acres in size located north of Magnox Drive and east of Tract Fork. The property is accessed from Magnox Drive. The site slopes from east to west toward Tract Fork. There are multiple buildings located on the property with associated parking, sidewalks, and other features. The building is currently abandoned.

Tract Fork, shown in the FEMA Flood Insurance Study, is located along the west side of the property. Tract Fork drains under a bridge on Magnox Drive at the southwest corner of the property and continues to flow approximately 450 feet south to the convergence with Peak Creek. The 100-year floodplain and floodway for Tract Fork extends into the site, along with the 500-year floodplain according to the FEMA FIRM. The Tract Fork floodplain converges with the Peak Creek floodplain just south of the Magnox Drive bridge south end of the site.

Proposed Conditions

The site is proposed to be developed by restoring the existing buildings, adding onto the existing buildings and reworking the parking lot and other areas adjacent to the building. The planned use of the property is a Community and Cultural Center. The majority of the parking lot on the west side of the building will be milled, removed and replaced. Additional demolition of existing stairs, concrete pads, walkways, and other features will be removed. The entire site with the exception of the southeastern corner is located within the 100-year floodplain with portions of the western edge of the site also within the Floodway. Proposed improvements to the site include building additions, parking reconfiguration, utility installation, and upgraded storm water systems. Construction on the site will be conducted within the 100-year floodplain with portions of the parking reconfiguration within the Floodway. The grades within the floodway will not be increased but construction needs to be done in these areas to achieve adequate parking and drainage. Approximately 0.93 acres of the property will be disturbed with the proposed site plan. Grading will be done in the 100-year floodplain to achieve adequate buildable area and grade for parking and drainage. The fill within the floodplain will not have a significant effect on the 100-year floodplain elevation as described in the subsequent sections of this report and in the additional documentation provided.

Methods and Assumptions

The FIRM for this area and the Pulaski County Flood Insurance Study (FIS) provides elevation and cross section locations for Tract Fork and Peak Creek. Tract Fork is adjacent to the proposed site. According to the FIS and FEMA floodplain mapping the 100-year floodplain on the site is from Tract Fork and is at approximate elevation 1918.3 feet. We obtained information from FEMA with up-to-date HEC-1 model information for Tract Fork and Peak Creek. We also utilized the revised preliminary FEMA Flood Insurance Study (FIS) to review the cross section location, flow data, and reach information. This information was the primary source for modeled FEMA floodplain information used in this study. The FEMA data was plugged into a HEC-RAS model to determine the flood elevations and create usable and comparable models for various scenarios. We reviewed the cross-section information in the FEMA model data and found that FEMA showed the bridge below the site and existing building on the site. The 100-year elevation of the FEMA model was higher than the elevation shown on FEMA mapping, model elevation 1919.03 compared to 1918.3 FEMA mapping. To maintain consistency of the modeling, we utilized the FEMA model as the base of the effective model to compare elevations.

The existing sections in the FEMA model are sections 0.08 at the upper end of the bridge, 0.09 at the lower end of the property, and 0.189 approximately 230 feet upstream of the property. Additional cross-sections were added to the FEMA model to adequately model the improvements to the property. These sections were numbered 0.10 and 0.11 and both were within the proposed development limits. The new sections were modeled with both existing and proposed conditions to determine whether there were any effects to the floodplain because of this development.

The FEMA model contained flow data that was not changed with this study. The flow data of 4600 cubic feet per second (cfs) matched the FEMA FIS for the 100-year flood on Tract Fork. All models used the same flow data as provided by FEMA since the development will not have an effect on the overall flow to this floodplain.

The elevation data in the cross sections was not changed since a verification of the cross sections elevations found that they were similar to the existing grades found on the site. Since the grades were found to be similar we used field run topography and LiDAR to add the additional sections within the property limits.

We utilized the FEMA model as a basis to ensure that the data and cross sections used were adequate. We then created an effective model, also known as existing conditions, using the FEMA model as a base and added two cross sections to supplement the data and provide additional information for the site improvements. A proposed model was then created by adjusting the new cross sections used in the existing model with the proposed grades and building additions. A comparison of these models will provide sufficient data to determine whether the project is causing an increase in the 100-year floodplain.

Results

The models used in this study produced a flood elevation that is slightly higher than the elevations shown on the FEMA mapping. With this analysis we are not proposing changing the limits of the

floodplain on the plan based on the elevations, only comparing the elevations of the models to ensure there is no increase in the floodplain. The table below include the three separate floodplain models utilized: the FEMA model, the effective existing model, and the proposed model.

Cross Section	FEMA Model Elev.	Effective Model Elev	Proposed Model Elev.
0.08	1919.03	1919.03	1919.03
0.09	1919.46	1919.57	1919.57
0.10		1919.96	1919.95
0.11		1920.19	1920.16
0.189	1920.65	1920.54	1920.59

The comparison between the FEMA, Effective or existing conditions model and proposed conditions showed that the proposed development has a minimal impact on the 100-year flood elevations across the site. There is no increase in 100-year flood elevation between the Effective and Proposed models except for section 0.189 that is outside of the site limits. At this location the proposed elevation is still less than the FEMA model so there is no effect on the overall floodplain. The other location that shows an increase in the floodplain is at section 0.09 where the Effective and Proposed models are both above the FEMA floodplain at this location. This is attributable to adding additional cross sections upstream that affect the elevation and flow modeling through the area. Typically adding cross sections has an effect on the floodplain elevation when sections are added due to the increased level of accuracy and detail provided. These elevation changes can happen positively or negatively depending on the additional data provided. In this case there is a slight increase in the floodplain elevation but there is no increase between the existing and proposed models which shows the development does not cause an increase in the floodplain at this location.

In conclusion, the proposed Calfee Community and Cultural Center development does not cause an increase in the 100-year floodplain elevation along Tract Fork.

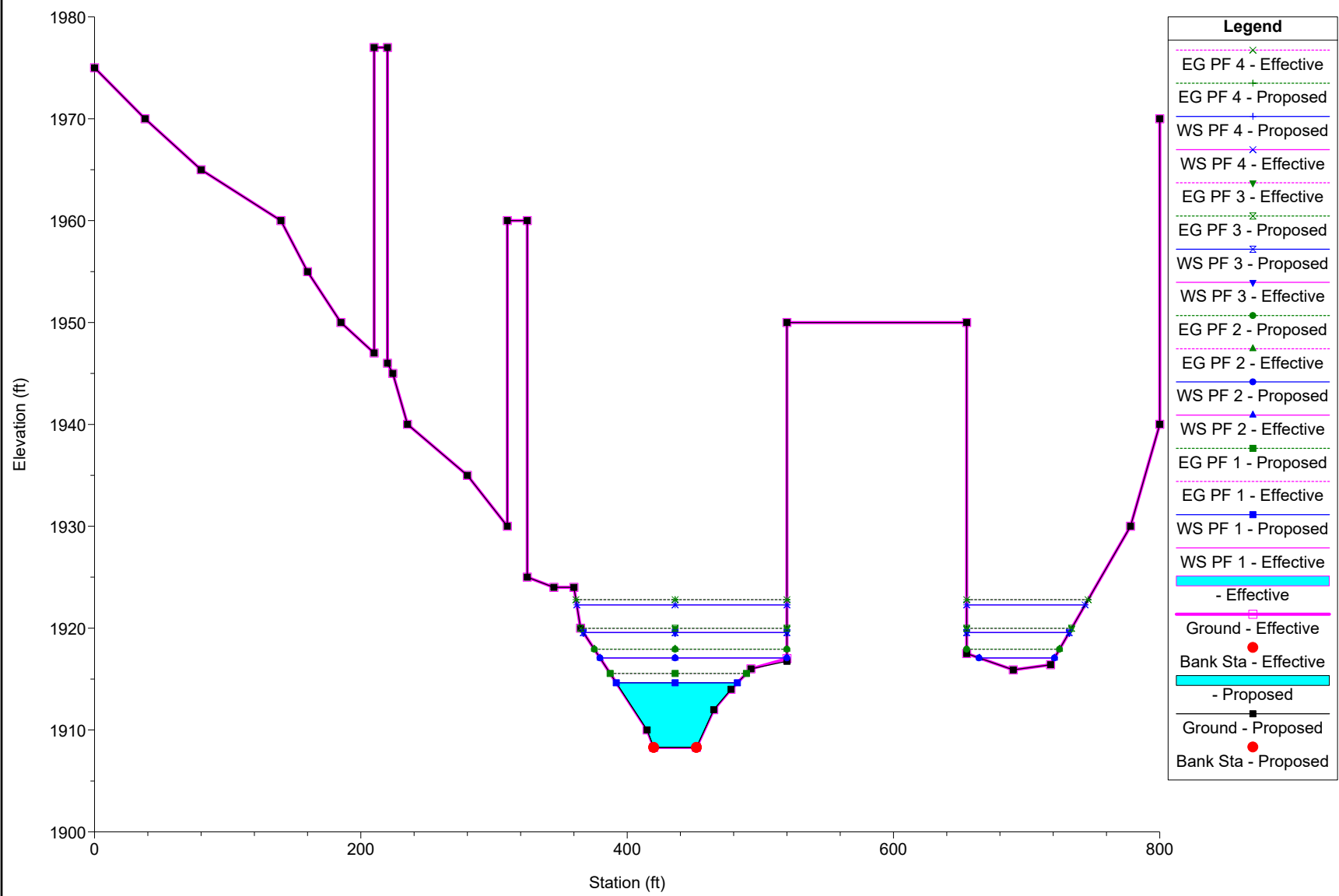
Appendix A

HEC RAS Data

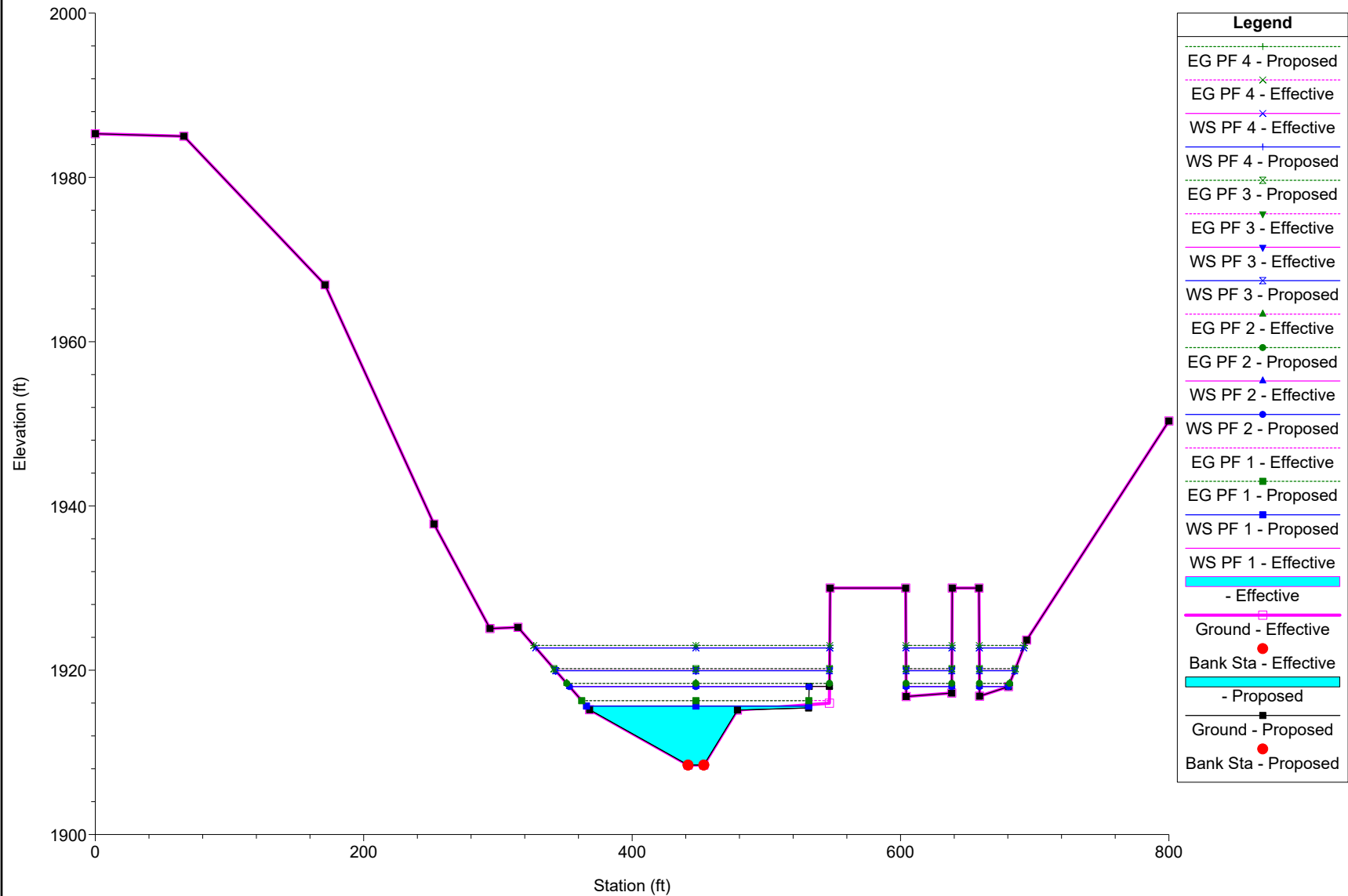
HEC-RAS River: RIVER-1 Reach: Reach-1 Profile: PF 3

Reach	River Sta	Profile	Plan	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Reach-1	0.948	PF 3	Effective	4490.00	1932.00	1942.66		1943.55	0.004752	9.92	723.97	107.55	0.54
Reach-1	0.948	PF 3	FEMA Model	4490.00	1932.00	1942.66		1943.55	0.004752	9.92	723.97	107.55	0.54
Reach-1	0.948	PF 3	Proposed	4490.00	1932.00	1942.66		1943.55	0.004752	9.92	723.97	107.55	0.54
Reach-1	0.865	PF 3	Effective	4490.00	1930.00	1938.76	1938.37	1940.41	0.011320	13.44	607.61	152.21	0.80
Reach-1	0.865	PF 3	FEMA Model	4490.00	1930.00	1938.76	1938.37	1940.41	0.011319	13.43	607.62	152.22	0.80
Reach-1	0.865	PF 3	Proposed	4490.00	1930.00	1938.76	1938.37	1940.41	0.011319	13.43	607.62	152.22	0.80
Reach-1	0.73	PF 3	Effective	4490.00	1925.00	1932.44		1933.27	0.008367	10.36	735.79	149.32	0.67
Reach-1	0.73	PF 3	FEMA Model	4490.00	1925.00	1932.44		1933.27	0.008368	10.36	735.78	149.32	0.67
Reach-1	0.73	PF 3	Proposed	4490.00	1925.00	1932.44		1933.27	0.008368	10.36	735.78	149.32	0.67
Reach-1	0.602	PF 3	Effective	4490.00	1920.00	1931.07		1931.34	0.001250	5.22	1381.57	225.33	0.28
Reach-1	0.602	PF 3	FEMA Model	4490.00	1920.00	1931.07		1931.34	0.001250	5.22	1381.40	225.33	0.28
Reach-1	0.602	PF 3	Proposed	4490.00	1920.00	1931.07		1931.34	0.001250	5.22	1381.48	225.33	0.28
Reach-1	0.509	PF 3	Effective	4490.00	1918.60	1929.57		1930.37	0.003140	8.22	766.45	106.69	0.44
Reach-1	0.509	PF 3	FEMA Model	4490.00	1918.60	1929.57		1930.37	0.003141	8.22	766.32	106.68	0.44
Reach-1	0.509	PF 3	Proposed	4490.00	1918.60	1929.57		1930.37	0.003141	8.22	766.37	106.69	0.44
Reach-1	0.5	PF 3	Effective	4490.00	1918.50	1928.94	1925.68	1930.14	0.006542	8.79	514.98	83.91	0.51
Reach-1	0.5	PF 3	FEMA Model	4490.00	1918.50	1928.93	1925.68	1930.14	0.006545	8.79	514.85	83.78	0.51
Reach-1	0.5	PF 3	Proposed	4490.00	1918.50	1928.94	1925.68	1930.14	0.006544	8.79	514.90	83.83	0.51
Reach-1	0.497		Bridge										
Reach-1	0.494	PF 3	Effective	4490.00	1918.50	1927.26	1925.66	1929.06	0.012206	10.78	416.32	56.00	0.70
Reach-1	0.494	PF 3	FEMA Model	4490.00	1918.50	1927.25	1925.66	1929.06	0.012239	10.79	415.94	56.00	0.70
Reach-1	0.494	PF 3	Proposed	4490.00	1918.50	1927.25	1925.66	1929.06	0.012222	10.79	416.14	56.00	0.70
Reach-1	0.485	PF 3	Effective	4490.00	1918.30	1926.84		1928.55	0.007898	11.04	477.43	69.75	0.67
Reach-1	0.485	PF 3	FEMA Model	4490.00	1918.30	1926.84		1928.55	0.007927	11.05	476.82	69.72	0.67
Reach-1	0.485	PF 3	Proposed	4490.00	1918.30	1926.84		1928.55	0.007911	11.04	477.14	69.74	0.67
Reach-1	0.349	PF 3	Effective	4600.00	1915.20	1922.64		1923.35	0.005987	8.76	782.84	143.01	0.57
Reach-1	0.349	PF 3	FEMA Model	4600.00	1915.20	1922.66		1923.36	0.005919	8.73	785.88	143.11	0.56
Reach-1	0.349	PF 3	Proposed	4600.00	1915.20	1922.65		1923.35	0.005955	8.74	784.27	143.06	0.56
Reach-1	0.189	PF 3	Effective	4600.00	1909.00	1920.54		1920.76	0.001699	6.25	1438.61	228.68	0.32
Reach-1	0.189	PF 3	FEMA Model	4600.00	1909.00	1920.65		1920.86	0.001618	6.14	1463.49	229.83	0.32
Reach-1	0.189	PF 3	Proposed	4600.00	1909.00	1920.59		1920.80	0.001658	6.20	1450.80	229.25	0.32
Reach-1	0.11	PF 3	Effective	4600.00	1908.62	1920.19		1920.36	0.001554	5.99	1618.87	284.31	0.31
Reach-1	0.11	PF 3	Proposed	4600.00	1908.62	1920.16		1920.39	0.001942	6.69	1414.88	238.42	0.35
Reach-1	0.10	PF 3	Effective	4600.00	1908.46	1919.96		1920.19	0.001835	6.49	1457.06	264.65	0.34
Reach-1	0.10	PF 3	Proposed	4600.00	1908.46	1919.95		1920.19	0.001929	6.65	1431.59	264.50	0.35
Reach-1	0.09	PF 3	Effective	4600.00	1908.30	1919.57		1919.98	0.001984	6.65	1219.43	229.84	0.35
Reach-1	0.09	PF 3	FEMA Model	4600.00	1908.30	1919.46		1919.98	0.002402	7.27	1054.21	201.86	0.38
Reach-1	0.09	PF 3	Proposed	4600.00	1908.30	1919.57		1919.98	0.001969	6.63	1223.65	229.87	0.35
Reach-1	0.08	PF 3	Effective	4600.00	1907.40	1919.03	1914.62	1919.85	0.003906	7.32	680.09	135.18	0.41
Reach-1	0.08	PF 3	FEMA Model	4600.00	1907.40	1919.03	1914.62	1919.85	0.003906	7.32	680.09	135.18	0.41
Reach-1	0.08	PF 3	Proposed	4600.00	1907.40	1919.03	1914.62	1919.85	0.003906	7.32	680.09	135.18	0.41
Reach-1	0.0775		Bridge										
Reach-1	0.075	PF 3	Effective	4600.00	1907.40	1917.40	1914.62	1918.63	0.006923	8.90	517.04	62.00	0.54
Reach-1	0.075	PF 3	FEMA Model	4600.00	1907.40	1917.40	1914.62	1918.63	0.006923	8.90	517.04	62.00	0.54
Reach-1	0.075	PF 3	Proposed	4600.00	1907.40	1917.40	1914.62	1918.63	0.006923	8.90	517.04	62.00	0.54
Reach-1	0.065	PF 3	Effective	4600.00	1907.90	1917.26		1918.15	0.005052	9.38	896.54	249.17	0.54
Reach-1	0.065	PF 3	FEMA Model	4600.00	1907.90	1917.26		1918.15	0.005052	9.38	896.54	249.17	0.54
Reach-1	0.065	PF 3	Proposed	4600.00	1907.90	1917.26		1918.15	0.005052	9.38	896.54	249.17	0.54
Reach-1	0.032	PF 3	Effective	4600.00	1906.00	1916.47		1917.30	0.004514	9.56	987.54	284.44	0.52
Reach-1	0.032	PF 3	FEMA Model	4600.00	1906.00	1916.47		1917.30	0.004514	9.56	987.54	284.44	0.52
Reach-1	0.032	PF 3	Proposed	4600.00	1906.00	1916.47		1917.30	0.004514	9.56	987.54	284.44	0.52
Reach-1	0.024	PF 3	Effective	4600.00	1906.00	1916.65		1917.04	0.002267	6.85	1260.19	258.29	0.37
Reach-1	0.024	PF 3	FEMA Model	4600.00	1906.00	1916.65		1917.04	0.002267	6.85	1260.19	258.29	0.37
Reach-1	0.024	PF 3	Proposed	4600.00	1906.00	1916.65		1917.04	0.002267	6.85	1260.19	258.29	0.37
Reach-1	0.02	PF 3	Effective	4600.00	1905.90	1916.46		1916.98	0.002245	6.78	1196.22	316.69	0.37
Reach-1	0.02	PF 3	FEMA Model	4600.00	1905.90	1916.46		1916.98	0.002245	6.78	1196.22	316.69	0.37
Reach-1	0.02	PF 3	Proposed	4600.00	1905.90	1916.46		1916.98	0.002245	6.78	1196.22	316.69	0.37
Reach-1	0.01	PF 3	Effective	4600.00	1905.80	1916.63	1913.38	1916.79	0.001011	4.63	1855.68	335.84	0.25
Reach-1	0.01	PF 3	FEMA Model	4600.00	1905.80	1916.63	1913.38	1916.79	0.001011	4.63	1855.68	335.84	0.25
Reach-1	0.01	PF 3	Proposed	4600.00	1905.80	1916.63	1913.38	1916.79	0.001011	4.63	1855.68	335.84	0.25

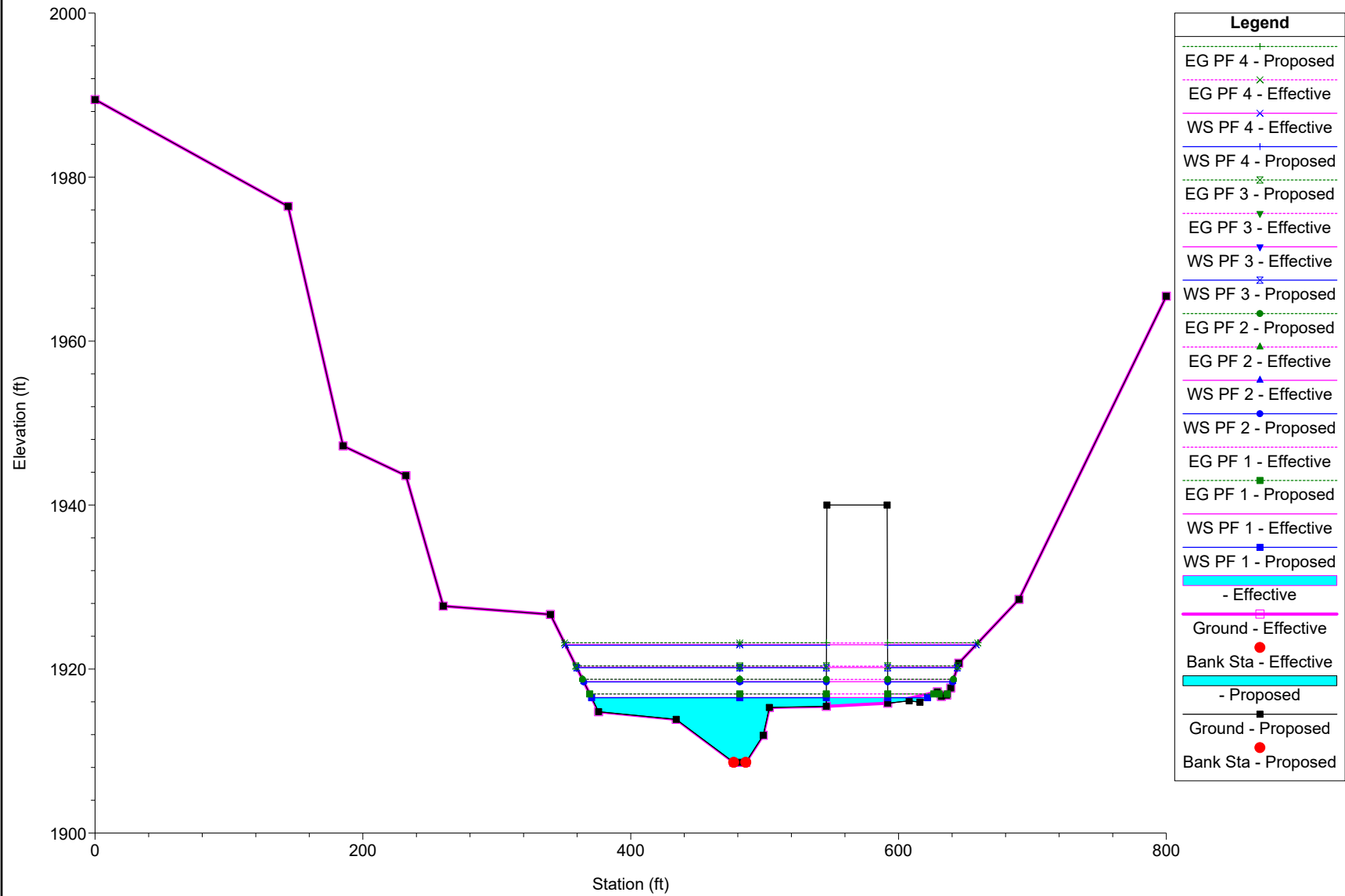
TRFKREV2 Plan: 1) Proposed 2) Effective
Section 0.09



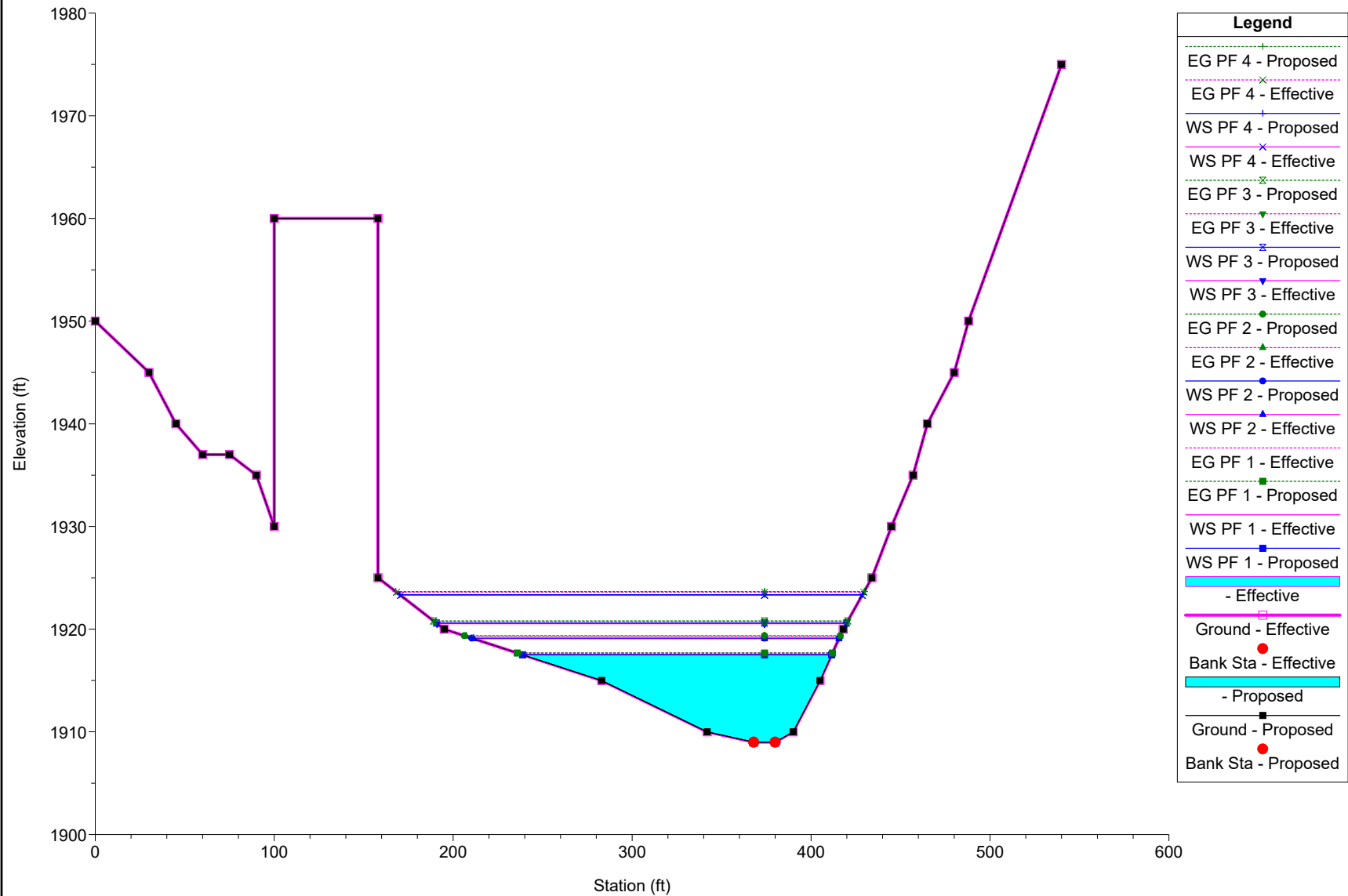
TRFKREV2 Plan: 1) Proposed 2) Effective
Section 0.10

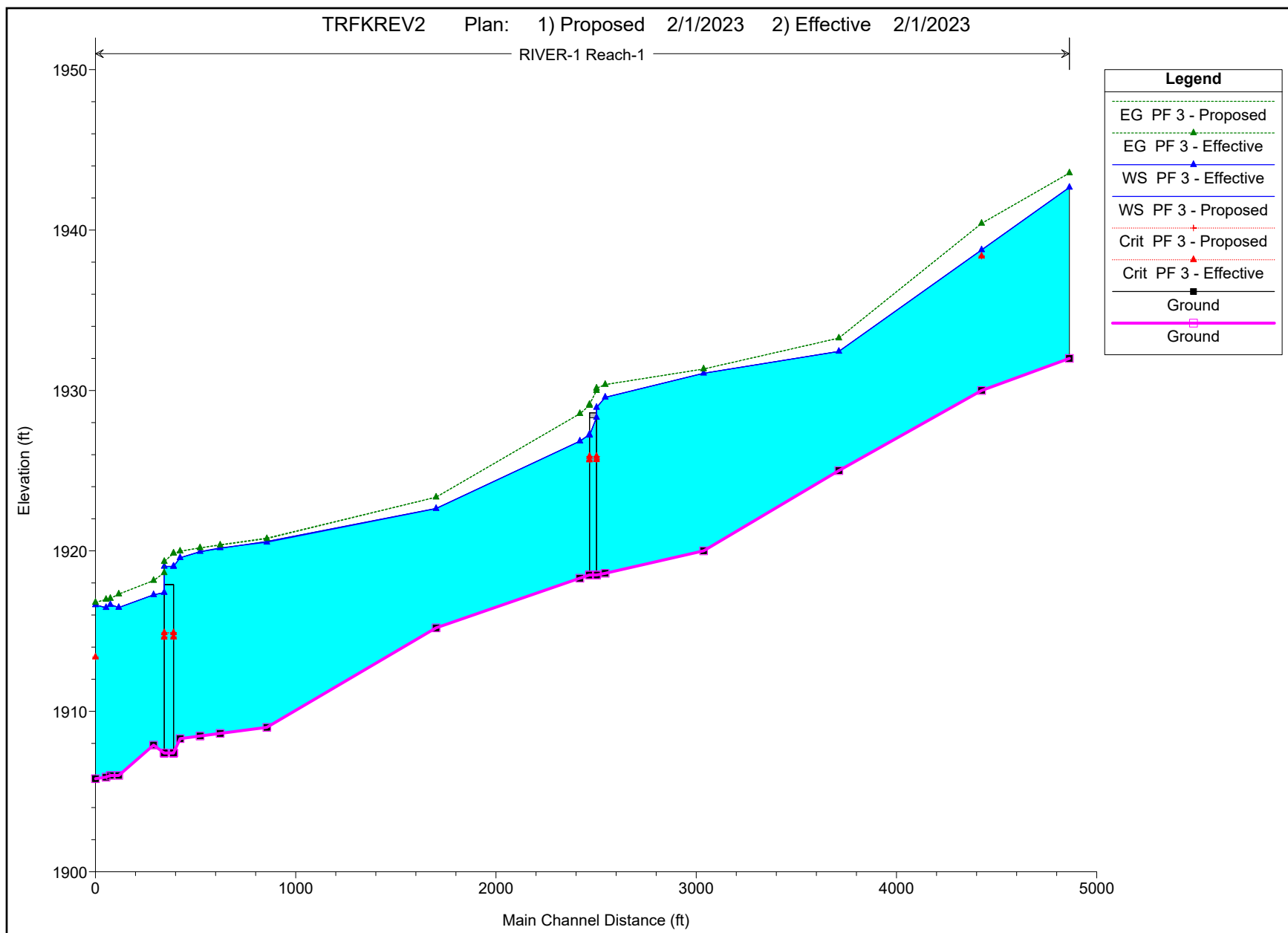


TRFKREV2 Plan: 1) Proposed 2) Effective
Section 0.11



TRFKREV2 Plan: 1) Proposed 2) Effective
Section 0.189





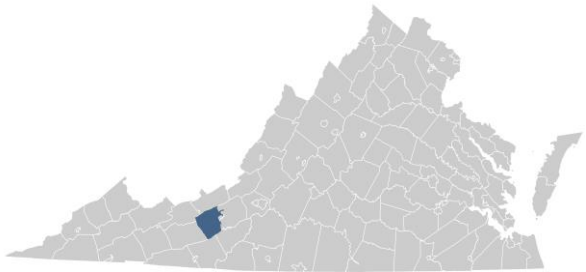
Appendix B

FEMA FIS Sheets

FLOOD INSURANCE STUDY

FEDERAL EMERGENCY MANAGEMENT AGENCY

VOLUME 1 OF 1



PULASKI COUNTY, VIRGINIA

AND INCORPORATED AREAS

COMMUNITY NAME	COMMUNITY NUMBER
DUBLIN, TOWN OF*	510211
PULASKI COUNTY, UNINCORPORATED AREAS	510125
PULASKI, TOWN OF	510126

*No Special Flood Hazard Areas Identified



FEMA

**REVISED
PRELIMINARY
5/15/2022**

REVISED:

TBD

FLOOD INSURANCE STUDY NUMBER

51155CV000B

Version Number 2.4.3.5

Table 9: Summary of Discharges

Flooding Source	Location	Drainage Area (Square Miles)	Peak Discharge (cfs)					
			10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance Existing	1% Annual Chance Future	0.2% Annual Chance
Little River	Confluence with the New River	335	15,100	*	24,800	29,700	*	42,800
New River	At Giles County line	3,850	100,000	*	175,000	235,000	*	*
	At Allisonia Gage	2,202	*	*	*	133,397	*	*
Peak Creek	Approximately 0.6 miles downstream of confluence of Thorne Springs	84.3	5,324	*	8,591	10,800	*	21,780
	Approximately 0.6 miles downstream of the confluence of Sproules Run	65.5	4,400	*	7,100	9,000	*	18,000
	Above the confluence of Sproules Run	62.3	4,100	*	6,560	8,250	*	16,800
	Above the confluence of Tract Fork	33.7	2,740	*	4,400	5,450	*	10,100
	At western county boundary	32.4	2,660	*	4,300	5,300	*	10,100
Pondlick Branch	Confluence of Tract Fork	3.3	560	*	910	1,180	*	2,020
	Upstream of Tributary A	2.3	435	*	755	925	*	1,440
Sproules Run	Confluence of Peak Creek	2.4	500	*	850	1,100	*	1,500
Tract Fork	Confluence of Peak Creek	25.8	2,300	*	3,700	4,600	*	8,300
	At lower study limit	25.0	2,190	*	3,520	4,400	*	8,100
	Upstream of Pondlick Branch	21.7	1,950	*	3,200	4,025	*	7,400

Table 23: Floodway Data (continued)

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE ¹	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Tract Fork								
A	115	86	763	6.0	1,917.2	1,916.3 ²	1,917.2	0.9
B	420	71	652	7.1	1,918.3	1,918.3	1,918.8	0.5
C	950	118	1,152	4.0	1,919.9	1,919.9	1,920.8	0.9
D	1,800	81	592	7.8	1,921.9	1,921.9	1,922.8	0.9
E	2,630	56	554	8.1	1,928.5	1,928.5	1,928.8	0.3
F	3,120	113	1,019	4.4	1,930.2	1,930.2	1,930.9	0.7
G	5,300	62	583	7.5	1,941.9	1,941.9	1,942.6	0.7
H	6,060	103	707	6.2	1,949.1	1,949.1	1,949.8	0.7
I	6,448	119	1,091	4.0	1,954.7	1,954.7	1,955.7	1.0
J	6,476	105	764	5.8	1,954.8	1,954.8	1,955.8	1.0
K	6,606	135	1,397	2.9	1,957.4	1,957.4	1,957.9	0.5
L	7,001	150	1,203	3.3	1,958.1	1,958.1	1,958.8	0.7
M	7,636	81	697	5.8	1,959.2	1,959.2	1,960.2	1.0
N	7,891	93	832	4.8	1,962.0	1,962.0	1,963.0	1.0
O	8,726	154	965	4.2	1,965.6	1,965.6	1,966.6	1.0
P	9,516	199	1,583	2.5	1,970.4	1,970.4	1,971.3	0.9
Q	9,956	154	1,196	3.4	1,972.3	1,972.3	1,973.3	1.0
R	10,391	151	1,138	3.5	1,974.8	1,974.8	1,975.7	0.9
S	11,041	118	763	5.1	1,977.7	1,977.7	1,978.6	0.9
T	11,521	83	750	5.2	1,981.0	1,981.0	1,982.0	1.0
U	12,061	143	1,101	3.5	1,984.5	1,984.5	1,985.2	0.7
V	12,356	132	1,099	3.4	1,987.6	1,987.6	1,988.5	0.9
W	12,986	121	1,137	3.3	1,989.2	1,989.2	1,990.2	1.0

¹ Feet above confluence with Peak Creek² Elevation computed without consideration of backwater effects from Peak Creek

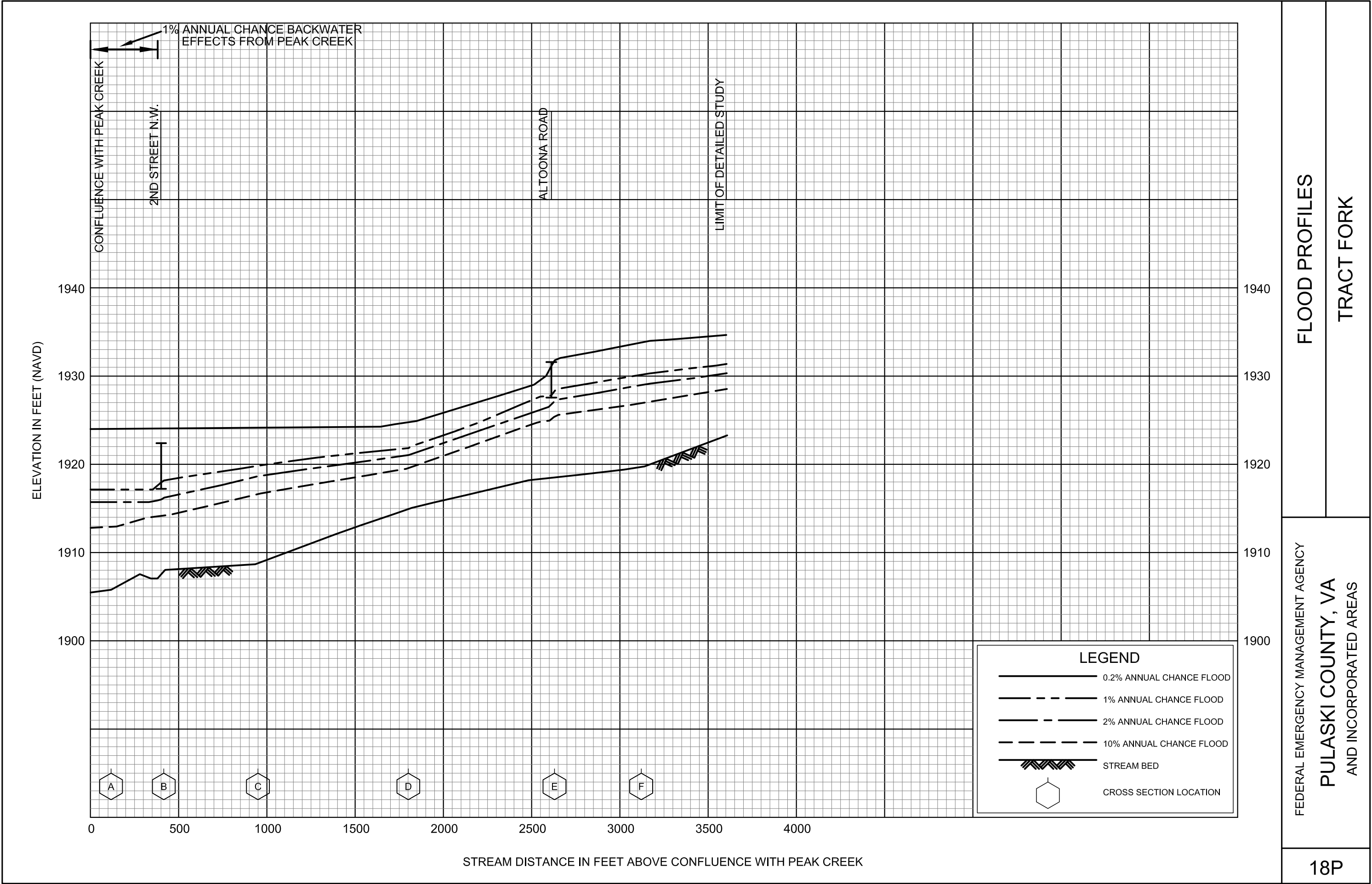
TABLE 23

FEDERAL EMERGENCY MANAGEMENT AGENCY

PULASKI COUNTY, VA
AND INCORPORATED AREAS

FLOODWAY DATA

FLOODING SOURCE: TRACT FORK



FLOOD PROFILES

TRACT FORK

FEDERAL EMERGENCY MANAGEMENT AGENCY

PULASKI COUNTY, VA
AND INCORPORATED AREAS

Appendix C

Plan



**BALZER
& ASSOCIATES**
PLANNERS / ARCHITECTS
ENGINEERS / SURVEYORS

Roanoke / Richmond
New River Valley
Shenandoah Valley
www.balzer.cc
15871 City View Drive
Suite 200
Midlothian, VA 23113
804.794.0571

PRELIMINARY

CALFEE COMMUNITY & CULTURAL CENTER

FLOODPLAIN PLAN

1 MAGNOX DRIVE
POLASKI, VIRGINIA

DRAWN BY MSL
DESIGNED BY MSL
CHECKED BY JRT
DATE 2/1/2023
SCALE AS NOTED
REVISIONS

C1

PROJECT NO. 23220008.00

